

# **System Test Plan**

**For**

**STaTE**

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# 1. Introduction

## 1.1 Purpose

This document is a test plan for STaTE System Testing, produced by the System Testing team. It describes the testing strategy and approach to testing the team will use to verify that the application meets the established requirements of the business prior to release.

## 1.2 Objectives

- § Meets the requirements, specifications and the Business rules.
- § Supports the intended business functions and achieves the required standards.
- § Satisfies the Entrance Criteria for User Acceptance Testing.

# 2. Functional Scope

The Modules in the scope of testing for the STaTE System Testing are mentioned in the document attached in the following path :

1. The System Requirements Specification document:  
<https://docs.google.com/document/d/1q5JuSA-si0S4cOKsCn4mEwCQLYVZNxXoxaXPBYp9FI/edit#>
2. Section 3.1 of this document.

# 3. Overall Strategy and Approach

## 3.1 Testing Strategy

STaTE System Testing will include testing of all functionalities that are in scope (Refer Functional Scope Section) identified. System testing activities will include the testing of new functionalities, modified functionalities, screen level validations, work flows, functionality access, testing of internal & external interfaces. Section 3.2 will explain what needs to be tested, but the following subsections in 3.1 describe how each testing type will be tested.

### 3.1.1 Usability Testing

**Test Objective:** To measure and prove how easy the STaTE system is for a user. Ensure that the system is effective, efficient, accurate and user-friendly.

**Technique:** Start with screening and pre-test for a general user. Have general users (no developers) perform use cases as described in the usability test plan as the in-test questions. Record the testers post-test answers.

**Completion Criteria:** When 5-12 prescreened general users have taken and responded to the usability test post-test questions.

### 3.1.2 Functional Testing

**Test Objective:** The STaTE's navigation, data entry, data output, and processing according to the specific requirements in the SRS. Provides verification that the software is accurate according to definite inputs and expected outputs.

**Technique:** Execute use cases as described from the use case diagram. When valid data is entered, the corresponding success result shall yield. When invalid data is entered, the corresponding error result shall yield.

**Completion Criteria:** When all use cases from the use case diagram have been tested and expected results are returned.

**Testing Assumption Consideration:** Access to the STaTe system and the corresponding SRS document.

### 3.1.3 Database Testing

**Test Objective:** Ensure the SQLite database has complete integration with SWA for the proper saving and retrieval of data.

**Technique:** Execute all instances of data saving and retrieval in the SWA, and check the SQLite for the test data equality.

**Completion Criteria:** When the data in the database matches the test data.

### 3.1.4 Performance Testing

**Test Objective:** Ensure the STaTe system can handle real time scenarios and address issues to deliver an efficient product. Provides verification that the system behaves as expected for various conditions.

**Technique:** Execute condition cases as described in the condition case diagram. When conditions are met, the system shall perform to the standards described in the expected system behavior.

**Completion Criteria:** When all condition cases from the condition case diagram have been tested and expected system behavior has been achieved.

### 3.1.5 Documentation Testing

**Test Objective:** Ensure that the information explained in the documentation, properly matches what is available in the software. Also, checks that the explanation is sufficient and clearly explained.

**Technique:** TBD. Most likely similar to usability testing, when a general user would attempt to use documentation as described in the test plan. User would give feedback and results.

**Completion Criteria:** When 5-12 prescreened general users have taken and responded to the post-test questions.

## 3.2 System Testing Entrance Criteria

In order to start system testing, certain requirements must be met for testing readiness. The readiness can be classified into: usability testing, functional testing, and data and documentation testing.

STEC-1: Availability of testable code

STEC-2: Defined requirements

STEC-3: Access to necessary test data

STEC-4: Readiness of test cases

STEC-5: Availability of a prepared test environment with the needed tools and resources

STEC-6: Ensure preconditions are met and eradicate defects when not met.

## 3.3 Testing Types

### 3.3.1 Usability Testing

User interface attributes, cosmetic presentation and content will be tested for accuracy and general usability. The goal of Usability Testing is to ensure that the

User Interface is comfortable to use and provides the user with consistent and appropriate access and navigation through the functions of the application (e.g., access keys, consistent tab order, readable fonts etc.) as outlined in the:

- Software Quality Attributes, Usability

System Requirements Specification, 5.4.1 SQA-1: “The program shall be intuitive for the user to interact with, requiring little to no explanation for interacting with the program.”

System Requirements Specification, 5.4.1 SQA-2: “After login, both user interfaces shall have a locatable navigation pane on each page.”

System Requirements Specification, 5.4.1 SQA-3: “After login, both user interfaces shall have a locatable “Logout” button on each page.”

System Requirements Specification, 5.4.1 SQA-4: “On both login pages, the username vs password text box must be clearly marked and locatable.”

System Requirements Specification, 5.4.1 SQA-5: “On both login pages, there must be a marked and locatable “Login” button.”

System Requirements Specification, 5.4.1 SQA-6: “The program shall be intuitive for teachers to add anomalies in <n> clicks.”

System Requirements Specification, 5.4.1 SQA-7: “The program shall be intuitive for teachers to set up scenarios in <n> clicks.”

System Requirements Specification, 5.4.1 SQA-8: “The program shall be cross-platform compatible with all major browsers as of writing this document (Oct 2022).”

### **3.3.2 Functional Testing**

The objective of this test is to ensure that each element of the component meets the functional requirements of the business as outlined in the:

- Business / Functional Requirements
- Business rules or conditions

Other functional documents produced during the course of the project i.e. resolution to issues/change requests/feedback

System Requirements Specification, 4.1.3 SWA-FR-1: “SWA shall maintain a hosted web application at (URL TBD).”

System Requirements Specification, 4.1.3 SWA-FR-2: “SWA shall maintain a Home Page at (URL TBD)/Home.”

System Requirements Specification, 4.1.3 SWA-FR-3: “SWA shall maintain an About Page at (URL TBD)/About.”

System Requirements Specification, 4.1.3 SWA-FR-4: “SWA shall maintain a Contact Page at (URL TBD)/Contact.”

System Requirements Specification, 4.1.3 SWA-FR-5: “SWA shall navigate to (URL TBD)/Home when a user enters (URL TBD) in their browser.”

System Requirements Specification, 4.1.3 SWA-FR-6: “SWA shall display the Home Page when a user enters (URL TBD)/Home in their browser.”

System Requirements Specification, 4.1.3 SWA-FR-7: “SWA shall display the About Page when a user enters (URL TBD)/About in their browser.”

System Requirements Specification, 4.1.3 SWA-FR-8: “SWA shall display the Contact Page when a user enters (URL TBD)/Contact in their browser.”

System Requirements Specification, 4.1.3 SWA-FR-9: “Home Page shall display a “Login” button.”

System Requirements Specification, 4.1.3 SWA-FR-10: “The “Login” button displayed on Home Page shall navigate the user’s browser to (URL TBD)/FO/Login when selected.”

System Requirements Specification, 4.1.3 SWA-FR-11: “Home page shall display an “About” button.”

System Requirements Specification, 4.1.3 SWA-FR-12: “The “About” button displayed on Home Page shall navigate the user’s browser to (URL TBD)/About when selected.”

System Requirements Specification, 4.1.3 SWA-FR-13: “Home Page shall display a “Contact” button.”

System Requirements Specification, 4.1.3 SWA-FR-14: “The “Contact” button displayed on Home Page shall navigate the user’s browser to (URL TBD)/Contact when selected.”

System Requirements Specification, 4.1.3 SWA-FR-15: “Home Page shall display a welcome message and short description of the STaTE project.”

System Requirements Specification, 4.1.3 SWA-FR-16: “ About Page shall display a “Home” button.”



System Requirements Specification, 4.1.3 SWA-FR-17: “The “Home” button displayed on About Page shall navigate the user’s browser to (URL TBD)/Home when selected.”

System Requirements Specification, 4.1.3 SWA-FR-18: “About Page shall display information about the STaTE project including intended usage and copyrights.”

System Requirements Specification, 4.1.3 SWA-FR-19: “Contact Page shall display a “Home” button.”

System Requirements Specification, 4.1.3 SWA-FR-20: “The “Home” button displayed on Contact Page shall navigate the user’s browser to (URL TBD)/Home when selected.”

System Requirements Specification, 4.1.3 SWA-FR-21: “Contact Page shall display contact information for the developers and the administrators of STaTE.”

System Requirements Specification, 4.2.3 FOP-FR-1: “The FOP shall enact a visual change of a subsystem when a student changes a value.”

System Requirements Specification, 4.2.3 FOP-FR-2: “The FOP shall accurately pass user inputs to the control console.”

System Requirements Specification, 4.3.3 Control Console-FR-1: “ The Control Console shall present the indicators given by the SimCraft.”

System Requirements Specification, 4.3.3 Control Console-FR-2: “The Control Console shall allow commands for Angle of Incidence between 0 and 90 degrees.”

System Requirements Specification, 4.3.3 Control Console-FR-3: “The Control Console shall allow commands for Rotational Drift from 0.0 to 2.0 degrees/hour.”

System Requirements Specification, 4.3.3 Control Console-FR-4: “ The Control Console shall allow commands for the Fuel Level Sensor #1 from 0 to 100%.”

System Requirements Specification, 4.3.3 Control Console-FR-5: “The Control Console shall allow commands for the Fuel Level Sensor #2 from 0 to 100%.”

System Requirements Specification, 4.3.3 Control Console-FR-6: “The Control Console shall allow commands for the Fuel Pressure Sensor #1 from 0 to 30 psi.”

System Requirements Specification, 4.3.3 Control Console-FR-7: “The Control Console shall allow commands for the Fuel Pressure Sensor #2 from 0 to 30 psi.”

System Requirements Specification, 4.3.3 Control Console-FR-8: “The Control Console shall provide monitoring capabilities for the Power Distribution Subsystem.”

System Requirements Specification, 4.3.3 Control Console-FR-9: “The Control Console shall provide monitoring capabilities for the payloads.”

System Requirements Specification, 4.3.3 Control Console-FR-10: “The Control Console shall provide command capabilities for the payloads.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-1: “The Simulation Engine Attitude and Control console shall control the SimCraft in a Low Earth Orbit (LEO), with a period of 90 minutes.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-2: “The Simulation Engine Attitude and Control console shall control the SimCrafts exposure to sunlight for 45 minutes and the Earth's shadow for 45 minutes.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-3: “The Simulation Engine Attitude and Control console shall control sensors related to the Attitude and Control Subsystem, with nominal and off-nominal values.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-4: “The Simulation Engine Power Distribution console shall provide power to the SimCraft via power stored in the system’s batteries.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-5: “The Simulation Engine Power Distribution console shall distribute power as needed to the payload.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-6: “The Simulation Engine Power Distribution console shall have the ability to distribute power to the payload as needed, with excess power stored in the system’s batteries.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-7: “The Simulation Engine Power Distribution console shall have the ability to distribute power in the batteries to the SimCraft when the object is within Earth’s shadow.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-8: “The Simulation Engine Power Distribution console shall monitor solar panel power production, related to the angle of incidence with the sun, where the angle of incidence is defined as the angle between a line normal to the surface of the solar panel and the line pointing to the SimCraft to the sun.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-9: “The Simulation Engine Power Distribution console shall have the ability to control the angle of incidence of the SimCraft only to one degree of rotational freedom.”

System Requirements Specification, 4.4.3 Simulation Engine-FR-10: “The Simulation Engine Power Distribution console shall monitor the ACS, presumed to maintain an incidence angle of +/- 5 Degrees when operating normally, allowing for maximal energy capture during the daylight portion of the SimCraft orbit.”

System Requirements Specification, 4.5.3 SimCraft-FR-1: “The SimCraft shall monitor the spacecraft's angle of incidence with 0-5 Degrees as nominal indicator (green), 5-30 Degrees as off-nominal warning (yellow), and 30-90 Degrees as off-nominal error (red).”

System Requirements Specification, 4.5.3 SimCraft-FR-2: “The SimCraft shall monitor the spacecrafts rotational drift with 0.0-0.1 Deg/hr as nominal indicator (green), 0.1-2.0 Deg/hr as off-nominal warning (yellow), and greater than 2 Deg/hr as off-nominal error (red).”

System Requirements Specification, 4.5.3 SimCraft-FR-3: “The SimCraft shall monitor the spacecrafts Fuel Level Sensor #1 with 30-100% as nominal indicator (green), 10-30% as off-nominal warning (yellow), and 0-10% as off-nominal error (red).”

System Requirements Specification, 4.5.3 SimCraft-FR-4: “The SimCraft shall monitor the spacecrafts Fuel Level Sensor #2 with 30-100% as nominal indicator (green), 10-30% as off-nominal warning (yellow), and 0-10% as off-nominal error (red).”

System Requirements Specification, 4.5.3 SimCraft-FR-5: “The SimCraft shall monitor the spacecrafts Fuel Pressure Sensor #1 with 10-30 psi as nominal indicator (green), 5-10 psi as off-nominal warning (yellow), and 0-5 psi as off-nominal error (red).”

System Requirements Specification, 4.5.3 SimCraft-FR-6: “The SimCraft shall monitor the spacecrafts Fuel Pressure Sensor #2 with 10-30 psi as nominal indicator (green), 5-10 psi as off-nominal warning (yellow), and 0-5 psi as off-nominal error (red).”

System Requirements Specification, 4.5.3 SimCraft-FR-7: “The Solar Panel Subsystem shall monitor the SimCraft orbit, and solar arrays alignment showing energy gathering efficiency.”

System Requirements Specification, 4.5.3 SimCraft-FR-8: “The SimCraft shall have 3 payloads to manage independent of each other.”

System Requirements Specification, 4.5.3 SimCraft-FR-9: “The payload subsystem shall manage required power for each independent payload.”

System Requirements Specification, 4.5.3 SimCraft-FR-10: “The payload subsystem shall show power and general status indicators.”

System Requirements Specification, 4.5.3 Simulation Engine-FR-1: “The Solar Panel Subsystem shall monitor power intake when the SimCraft’s solar panels are pointed in the sun’s direction.”

System Requirements Specification, 4.6.3 TCP-FR-1: “TCP shall maintain a hosted web application at (URL TBD).”

System Requirements Specification, 4.6.3 TCP-FR-2: “TCP shall maintain a TC Home Page at (URL TBD)/TCHome.”

System Requirements Specification, 4.6.3 TCP-FR-3: “TCP shall maintain a Simulation Management Page at (URL TBD)/TCSimManage.”

System Requirements Specification, 4.6.3 TCP-FR-4: “TCP shall maintain a Simulation Display Page at (URL TBD)/TCSimDisplay.”

System Requirements Specification, 4.6.3 TCP-FR-5: “TCP shall maintain a Simulation Records Page at (URL TBD)/TCSimRecords.”

System Requirements Specification, 4.6.3 TCP-FR-6: “SWA shall navigate to (URL TBD)/TC when a user clicks the button to login as TC.”

System Requirements Specification, 4.6.3 TCP-FR-7: “TCP shall navigate to (URL TBD)/TCHome when a user enters the correct login credentials.”

System Requirements Specification, 4.6.3 TCP-FR-8: “TCP shall navigate to (URL TBD)/TCSimManage when a TC clicks a button to manage simulations.”

System Requirements Specification, 4.6.3 TCP-FR-9: “TCP shall navigate to (URL TBD)/TCSimDisplay when a TC clicks a button to start a simulation on the TC Simulation Management Page.”

System Requirements Specification, 4.6.3 TCP-FR-10: “TCP shall navigate to (URL TBD)/TCSimRecords when a TC clicks the button to view Simulation records.”

System Requirements Specification, 4.6.3 TCP-FR-11: “TCP shall navigate to (URL TBD)/TCHome from any TC Page “Home” button.”

System Requirements Specification, 4.6.3 TCP-FR-12: “Login Page shall display 2 text boxes: 1 for username, 1 for password.”

System Requirements Specification, 4.6.3 TCP-FR-13: “Login Page shall display a “Login” button.”

System Requirements Specification, 4.6.3 TCP-FR-14: “Login Page shall display a “Login as student” button that navigates users back to (URL TBD)/FO/Login.”

System Requirements Specification, 4.6.3 TCP-FR-15: “TC Home Page shall display a “Manage Simulations” button.”

System Requirements Specification, 4.6.3 TCP-FR-16: “The “Manage Simulations” button displayed on TC Home Page shall navigate the TCP user’s browser to (URL TBD)/TCSimManage when selected.”

System Requirements Specification, 4.6.3 TCP-FR-17: “TC Home Page shall display a “Simulation Records” button.”

System Requirements Specification, 4.6.3 TCP-FR-18: “The “Simulation Records” button displayed on TC Home Page shall navigate the TCP user’s browser to (URL TBD)/TCSimRecords when selected.”

System Requirements Specification, 4.6.3 TCP-FR-19: “TC Simulation Management Page shall display an “Add new Simulation” button.”

System Requirements Specification, 4.6.3 TCP-FR-20: “TC Simulation Manage Page shall display an “Edit Simulation” button.”

System Requirements Specification, 4.6.3 TCP-FR-21: “TC Simulation Manage Page shall display a “Start Simulation” button.”

System Requirements Specification, 4.6.3 TCP-FR-22: “The “start simulation” button displayed on Simulation Management Page shall navigate the TC User’s browser to (URL TBD)/TCDisplay when selected.”

System Requirements Specification, 4.6.3 TCP-FR-23: “The “Home” button displayed on the Simulation Management Page shall navigate the TC user’s browser to (URL TBD)/TCHome when selected.”

System Requirements Specification, 4.6.3 TCP-FR-24: “The Simulation Display Page shall display information about the active simulations.

System Requirements Specification, 4.6.3 TCP-FR-25: “The Simulation Display Page shall allow the TC to enter anomalies.”

System Requirements Specification, 4.6.3 TCP-FR-26: “The Simulation Display Page shall allow the TC to pause/stop an active simulation.”

System Requirements Specification, 4.6.3 TCP-FR-27: “The “Home” button displayed on the Simulation Display Page shall navigate the TC user’s browser to (URL TBD)/TCHome when selected.”

System Requirements Specification, 4.6.3 TCP-FR-28: “The Simulation Records Page shall display information about the previous simulations, including student reports and simulation comms.”

System Requirements Specification, 4.6.3 TCP-FR-29: “The Simulation Records Page shall allow the TC to download student records.”

System Requirements Specification, 4.6.3 TCP-FR-30: “The “Home” button displayed on the Simulation Records Page shall navigate the TC user’s browser to (URL TBD)/TCHome when selected.”

### **3.3.3 Database Testing**

The objective of this test is to ensure that the database meets the needs of the STaTE system and functions correctly as outlined in the:

- Database Requirements (SRS: 6.1)

System requirements Specification, 6.1 DR-1: “The Database shall store simulation states, which consist of all information of each simulation at a given time.”

System requirements Specification, 6.1 DR-2: “The database shall be able to send and receive data sets from the program.”

System requirements Specification, 6.1 DR-3: “The database shall be able to store text communications from users after a simulation has concluded.”

### **3.3.4 Performance testing**

The objective of this test is to ensure that the system meets the required performance behavior of at various load conditions as outlined in the:

- Performance Requirements
- Business conditions

System Requirements specification, 5.1 PR-1: “The program shall not exceed a response time of 10 ms from connections made in the United States, unless the current number of users exceeds the maximum number of users.”

System Requirements specification, 5.1 PR-2: “The program shall not exceed a response time of 20 ms from the connections made in the United States, unless the current number of users exceeds double the maximum number of users.”

System Requirements specification, 5.1 PR-3: “The program shall be capable of running <n> simulated missions in tandem while connected with the maximum number of users.”

System Requirements specification, 5.1 PR-4: “Local spacecraft data written regarding a simulated spacecraft shall not exceed 2 gb in size per simulated mission.”

System Requirements specification, 5.1 PR-5: “The program shall update data transmitted to the connected user no less than every <n> seconds.”

System Requirements specification, 5.1 PR-6: “The program shall save the simulated spacecraft data every <n> hours.”

System Requirements specification, 5.1 PR-7: “The program shall save all flight conductor and flight operator inputs.”

System Requirements specification, 5.1 PR-8: “In the event that the program suffers an error that ceases runtime, the program shall not lose any local data regarding conductor inputs.”

System Requirements specification, 5.1 PR-9: “In the event that the program suffers an error that ceases runtime, the program shall not lose any local data regarding a simulated spacecraft.”

System Requirements specification, 5.1 PR-10: “In the event that the program suffers an error that ceases runtime, the program shall attempt to restart the corresponding simulation using the latest version of the save data.”

System Requirements specification, 5.1 PR-11: “In the event that the program suffers an error that ceases runtime, the program shall alert all Test Conductor users.”

### **3.3.5 Documentation Testing**

Documentation describes all of the user guides, read me files, and system manuals that are provided with the software in order for the user to understand STaTE. The objective of this testing is to ensure that what is explained in the documentation, properly matches what is available in the software as outlined in:

- User Documentation (SRS 2.6)

System Requirements Specification, 2.6 UD-STANDARD-1: “The documentation will be provided online through the web application.”

System Requirements Specification, 2.6 UD-STANDARD-2: “The documentation can be downloaded, sent, or given in physical form to users.”

System Requirements Specification, 2.6 UD-STANDARD-3: “The intended audience of the documentation are the teachers conducting spacecraft control center training and the students in training. “

## **3.4 Suspension Criteria and Resumption Requirements**

This section will specify the criteria that will be used to suspend all or a portion of the testing activities on the items associated with this test plan.

### **3.4.1 Suspension Criteria**

Testing will be suspended if the following incidents found will not allow further testing of the system/application under-test:

- Discovery that one of the System Testing Entrance Criteria (refer to 3.2) is no longer met
- Program stops responding on a certain browser
- Database is not maintaining the proper data from most recent simulation run

If testing is halted, and changes are made to the software or database, it is up to the Testing Manager to determine whether the test plan will be re-executed or part of the plan will be re-executed.

### **3.4.2 Resumption Requirements**

Resumption of testing will be possible when the functionality that caused the suspension of testing has been retested successfully.

## **4. Execution Plan**

### **4.1 Execution Plan**

The execution plan will detail the test cases to be executed. The Execution plan will be put together to ensure that all the requirements are covered. The execution plan will be designed to accommodate some changes if necessary, if testing is incomplete on any day.



All the test cases of the projects under test in this release are arranged in a logical order depending upon their inter dependency.

The test plan for the STaTE system is as follows:

**4.1.1 Functional Testing** (See 3.1.2)

**4.1.2 Database Testing** (See 3.1.3)

**4.1.3 Usability Testing** (See 3.1.1)

**4.1.4 Performance Testing** (See 3.1.4)

**4.1.5 Documentation Testing** (See 3.1.5)

**Functional Testing - Use Case Table: SWA**

Requirements	Test Case ID	Input	Expected Behavior	Pass /Fail
SWA-FR-1, SWA-FR-2, SWA-FR-7, SWA-FR-8	SWA-TC-1	Enter http://127.0.0.1:8000 into internet browser's address bar.	Browser navigates to Home Page at http://127.0.0.1:8000.	Pass
SWA-FR-3, SWA-FR-9	SWA-TC-2	Enter http://127.0.0.1:8000/a bout into internet browser's address bar.	Browser navigates to About Page at http://127.0.0.1:8000/about.	Pass
SWA-FR-4, SWA-FR-10	SWA-TC-3	Enter http://127.0.0.1:8000/c ontact into internet browser's address bar.	Browser navigates to Contact Page at http://127.0.0.1:8000/contact.	Pass
SWA-FR-5,	SWA-TC-5	Enter http://127.0.0.1:8000/f o into internet browser's address bar.	Browser navigates to fo django application at http://127.0.0.1:8000/fo	Pass
SWA-FR-6,	SWA-TC-6	Enter http://127.0.0.1:8000/t c into internet browser's address bar.	Browser navigates to tc django application at http://127.0.0.1:8000/fo	Pass
SWA-FR-11, SWA-FR-12	SWA-TC-7	Select the "Login" button on the Home Page	Browser navigates to fo django application at http://127.0.0.1:8000/fo	Pass

SWA-FR-13, SWA-FR-14	SWA-TC-8	Select the “About” button on the Home Page	Browser navigates to About Page at http://127.0.0.1:8000/about.	Pass
SWA-FR-15, SWA-FR-16	SWA-TC-9	Select the “Contact” button on the Home Page	Browser navigates to Contact Page at http://127.0.0.1:8000/contact.	Pass
SWA-FR-18, SWA-FR-19	SWA-TC-10	Select the “Home” button on the About Page	Browser navigates to Home Page at http://127.0.0.1:8000.	Pass
SWA-FR-21, SWA-FR-22	SWA-TC-11	Select the “Home” button on the Contact Page	Browser navigates to Contact Page at http://127.0.0.1:8000/contact.	Pass

Table 4.1. Table relating system requirements found in the STaTE SRS to test cases. The Pass/Fail column signifies whether or not the actual system behavior is the same as the Expected Behavior when the Input criteria is met.

As more code is developed, the test diagrams for other components of system will be added to this section and the testing will be conducted. Many of the requirements for these other components have been developed and are listed in the SRS as well as in above sections.

## 5. Traceability Matrix & Defect Tracking

### 5.1 Traceability Matrix

List of requirement, corresponding test cases

**Requirement HIGH:** To measure user-friendliness and click efficiency.

**Test Cases:** Task a user to adjust a random aspect of the simulated spacecraft and measure how many steps and how much time it takes to accomplish the random task.

More to be added as the application is developed

### 5.2 Defect Severity Definitions

<b>Critical</b>	<p>The defect causes a catastrophic or severe error that results in major problems and the functionality rendered is unavailable to the users. A manual procedure done by the test conductor cannot be implemented, or a high effort is required to remedy the defect. Examples of a critical defect are as follows:</p> <ul style="list-style-type: none"> <li>• System failure, access is no longer granted to users</li> <li>• Data is corrupted or cannot post to the database</li> </ul>
<b>Medium</b>	<p>The defect does not seriously impair system function can be categorized as a medium defect. A manual procedure can be performed by the test conductor, requires medium effort, and can be implemented to remedy the defect. Examples of a medium defect are as follows:</p> <ul style="list-style-type: none"> <li>• System crashes, and needs a manual deployment or reset</li> <li>• System producing incorrect calculations</li> </ul>
<b>Low</b>	<p>The defect is cosmetic or has little to no impact on system functionality. A manual procedure requiring low effort can be implemented to remedy the defect. Examples of a low defect are as follows:</p> <ul style="list-style-type: none"> <li>• Incorrect text styles/sizes</li> <li>• Text boxes repositioned on screen</li> </ul>

## 6. Environment

### 6.1 Environment

Both the Web Application (through Django) and the SimCraft Simulation will be tested on local machines for general program debugging while writing the software, then will be pushed to a Web Application host for further testing and deployment. The Web Application host originally was on a personal server computer but was then moved to Microsoft Azure's cloud hosting application. Using Azure allows the developers to push changes to the github and have the changes automatically update on the Web Application within 5 minutes via means of Continuous Integration and Continuous Delivery (CI/CD).

Once deployed on Azure, the front end application will be able to be tested by any device with internet connection (access to HTML). The back-end application simulation will be able to be tested by a computer running the latest version of Microsoft Visual Studio Code and Python version 3.10.

## 7. Assumptions

This section list assumption that is made specific to this project:

- The user should be a student enrolled in the Space Flight Operations degree program at Embry-Riddle Aeronautical University, Daytona Beach (ERAU-DB) campus.
- The user has access to a desktop or laptop computer, mobile device, or tablet with connection to the internet.
- The user has somewhat of a background in spacecraft control and orbital systems.
- The simulation engine will reflect real events, allowing a test conductor to present the console team with off-nominal spacecraft behavior to give students practice in trouble-shooting and recovering from vehicle component deviations and failures.
- Assuming that all users of the simulation will be present and active for the entire duration of the sim.

## 8. Risks and Contingencies

Risk #	Risk	Impact	Contingency Plan
1	An unknown user entering a specific subdomain into the URL will lead them to a page of an active simulation.	High	As this is a security risk, testing the web applications redirections to ensure no unauthorized access to the SimCraft Simulation
2	Database receives conflicting data messages, causing the simulation to lag or crash.	Medium	Test conductor would have to check the console log, and the simulation would need to be redeployed.

## 9. Appendices

<TBD if needed in later versions. >